

Usage of Sunlight for Waking Up | Design Proposal

OVERVIEW

The task of the design team is to propose a feasible solution for the problem that is discussed below in the form of a physical product. The approach to the functioning of this product can be mechanical or electrical depending on the preference of the group.

NEED FOR A BETTER ALARM SYSTEM

A lot of time is wasted every morning, the time between one's alarm going off and them actually getting out of bed. We seek to minimize this wasted time using an alarm that wakes one up using sunlight and does not feature a 'snooze' button. A traditional sound based alarm rouses a person from whatever stage of their sleep cycle they are in at that time. This can affect the functioning of the person for the entire day. Light, especially sunlight, has been shown to influence sleep cycles.

The best way to wake up is to wake up with the sun, with low amounts of lighting entering the room as the sun starts to rise and finishing with the brightness of the fully risen sun. Sunlight resets our circadian rhythm, and when light hit receptors in the eyes, they send signals to the brain indicating that it is time to wake up. This way one's body is ready to wake up when it has to, and time is not wasted, thereby increasing one's personal efficiency.



Image obtained from [7]

PROBLEM INTRODUCTION



Waking up at sunrise is not usually feasible, as the sun rises at different times. However, simulated dawn, when the lighting in the room is slowly increased until full intensity is established, has the same effect as the sunrise. The task of the design group is to create a conceptual design of a product that would simulate dawn in a bedroom using sunlight/ outside light, for use as an alarm clock.

The clock/timer mechanism is digital and will be designed by an independent electronics manufacturer. The design group should integrate this mechanism with

their new design. The product will be triggered by the clock and the method of triggering needs to be specified in the design. The product should be designed to comply with the stated objectives and constraints and will be evaluated based on the stated criteria that follow.

OBJECTIVES OF THE DESIGN

The product should be designed keeping the following intentions in mind:

- The purpose of this product is to wake individuals up from sleep using sunlight. In order to serve this function, the device must let sunlight enter the room at a specified time and with sufficient, but not excessive intensity.
- Considering the fact that different consumers require various amount of light in order to wake up, it is absolutely necessary to incorporate a mechanism to allow for variable amounts of light intensity.
- In order to serve its purpose, the device should be able to wake people up regardless of the intensity of sunlight (which depends on the season, the location and the time of the day). For instance, when the user desires to get up early in the morning, the product should function in presence of alternative forms of outside light such as streets lights or moonlight.

CONDITIONS THAT THE ITEM SHOULD MEET

The design of the product should allow for the following constraints:

- **Safety:** The primary factor that must be considered is safety. The device should reduce light intensity, as desired by the customer, so that the light does not burn the skin of the user. It should also allow light to enter at different angles as preferred by the user. Additionally, the safety of children should also be kept in mind; for example, by not having parts where children can get their fingers caught. Furthermore, no part should be weak enough to fall off and hit the occupants of the room.
- **The size of the device:** The mechanism should not take up a lot of room. It must take up approximately as much space as normal curtains or blinds would. The timer and other parts can be designed to be supported on the wall, so that they don't take up floor space. It is also required for the product to be visually appealing and aesthetically pleasing.
- **Smooth and quick process:** The product should function exactly at the specified time without any lags or delays. It should be a quick and smooth process.
- **Compatibility with different kinds of windows:** The product should be able to function with different shapes and sizes of windows that are standardly used. The opening could be in the form of windows on a vertical wall, on a slanted ceiling or on a horizontal ceiling (skylight).
- **Obstruction of manual functionality:** The product should by no means restrict the manual usage of the opening. For example, if the designers choose to use

blinds, then the consumer should be able to manually open the blinds or open the windows if he/she wishes to, without the blinds limiting them from doing so.

DESIGN CRITERIA FOR THE PRODUCT

The product will be assessed based on the following criteria:

- **Energy Efficiency:** The product is required to be inexpensive to operate. The lower the monetary cost of the energy needed to run one cycle of the product, the better it is.
- **Generation of sound:** The intention of this product is to awaken individuals using light from outside, and not using any excess noises or squeaks produced by the product. Therefore, it would be ideal for the product to make lower than 30dB of noise, which is the noise level of a whisper or quiet library according to [6].
- **Complexity of Operation:** The consumer should be able to easily and intuitively regulate the different settings of the product because the product will be used on daily basis. It should take as less time as possible to make these adjustments.
- **Assemblage and Durability:** An easy installation method of the product will also benefit the consumer. The item must also be durable and easily repairable. It is preferable for the product to run through as many cycles as possible, before being repaired or replaced.
- **View through Window:** Keeping the privacy of the consumer in mind, the product must only partially reveal the room at its 'fully off' state. The less clear the view from outside and the lower the percentage of the portion of the room visible, the better it is. However, the designers must try to make sure that the view through the window or other orifices, from the inside, is as unobstructed as possible.

Works Cited

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